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James, M. [US/US]; 1309 Roberdeau, Richland, WA 99352 (US).

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(74) Agents: **BRADSHAW, John, M. et al.**; Woodard, Emhardt, Moriarty, McNett & Henry, LLP, Bank One Center/Tower, Suite 3700, 111 Monument Circle, Indianapolis, IN 46204 (US).

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(71) Applicant (*for all designated States except US*): **BATTELLE MEMORIAL INSTITUTE** [US/US]; P.O. Box 999, Richland, WA 99352 (US).

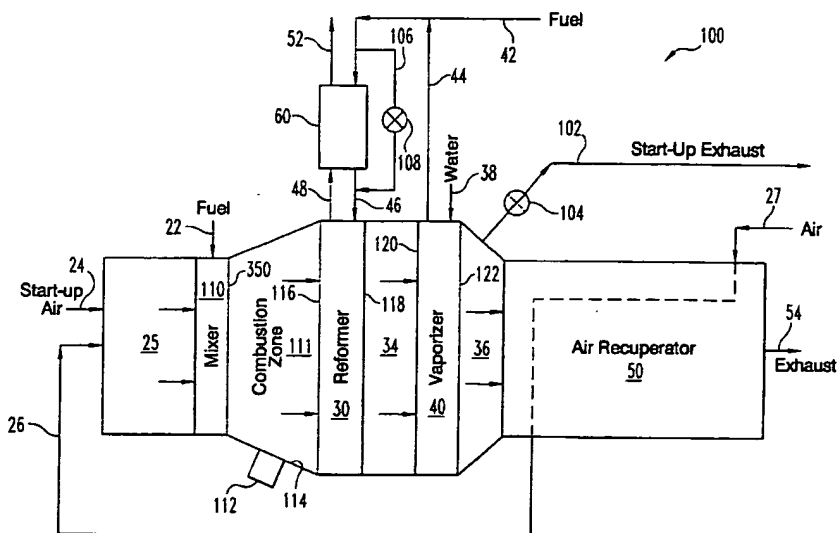
(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **WHYATT, Greg, A.** [US/US]; 3401 Equestrian Drive, West Richland, WA 99353 (US). **FISCHER, Christopher, M.** [US/US]; 5913 Terrace Heights Dr., Yakima, WA 98901 (US). **DAVIS,**

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[Continued on next page]

(54) Title: **RAPID START FUEL REFORMING SYSTEMS AND TECHNIQUES**



(57) Abstract: An on-board fuel processor includes a microchannel steam reforming reactor (30) and a water vaporizer (40) heated in series with a combustion gas. The reformer (30) and the vaporizer (40) are both of a cross-flow panel configuration that allows for low combustion side pressure drop. Fuel is directly injected into the steam, and during a rapid cold start, both the combustion gas flow rate and the steam to carbon ratio are substantially increased relative to their steady state operating values. A rapid cold start can be achieved in under 30 seconds with a manageable amount of electric power consumption, removing impediments to use in automotive fuel cell applications.

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